REVIEW

by Assoc. Prof. Silvia Ivanova Filkova, PhD
Medical University "Prof. Dr. P. Stoyanov" – Varna, Medical College – Varna,
Internal member of the Scientific Jury, appointed by Order No. P-109-154/27.03.2026 of the Rector of Medical University "Prof. Dr. Paraskev Stoyanov" – Varna

Regarding a doctoral thesis for the acquisition of the educational and scientific degree of Philosophy Doctor in the field of higher education 7. Healthcare and Sports, professional area 7.4. Public Health, a scientific speciality in Healthcare Management.

Thesis Author: Elka Dancheva Kostova, doctoral student at the Department of Healthcare, Medical University "Prof. Dr. Paraskev Stoyanov" – Varna, Sliven Affiliate

Thesis Subject: *Modern Competencies of the X-Ray Laboratory Assistant in Dental Digital Diagnostic Imaging*

Research Supervisor: Assoc. Prof. Svetlana Peneva Angelova, PhD

1. Introduction

The doctoral thesis has been developed in accordance with the requirements of the Act on the Development of the Academic Staff in the Republic of Bulgaria and the Rules for its application at the Medical University – Varna. The review is based on the thesis, the thesis summary, and the accompanying procedural documentation.

The research topic is relevant and distinctly practice-oriented. It addresses the competencies of X-ray laboratory technicians amid rapid digitalisation of dental imaging, the growing use of cone-beam computed tomography (CBCT), and the introduction of artificial intelligence-based tools. In this context, the adequacy of professional training and the need to update educational curricula hold unquestionable scientific and social importance.

2. Biographical Data

Elka Dancheva Kostova is a radiologic (X-ray) technologist with over 20 years of professional experience in imaging diagnostics. She graduated from the Medical College – Plovdiv in 2000, subsequently obtaining a Bachelor's and Master's degree in Healthcare Management and a specialisation in Public Health at the Medical University – Varna. Since 23.02.2023, she has been a full-time doctoral student at the Department of Healthcare – Sliven Affiliate. Her doctoral research is on *Modern Competencies of the X-Ray Laboratory Assistant in Dental Digital Diagnostic Imaging.* In the years 2020–2025, she held academic and administrative positions at the Medical College – Varna. E. Kostova has over 10 publications, participations in scientific forums, and research projects. Her scientific and professional interests are related to digital imaging diagnostics, quality in healthcare, and the development of professional competencies in medical education.

3. Relevance and Significance of the Topic

The doctoral thesis addresses issues of considerable importance for the healthcare system, professional education, and the quality of the diagnostic process. The digital transformation in

dental imaging not only changes the technical working environment but also the profile of the knowledge, skills, and professional competencies required of X-ray technicians.

Several key factors determine the relevance of research: rapid introduction of digital systems and cone beam computed tomography, increasing demands regarding radiation protection and professional qualifications, and a pressing need to advance training in line with current clinical practice. As such, the thesis carries both theoretical value and a distinctly practical orientation.

4. General Characteristics of the Thesis

The thesis is presented on 178 pages and is structured into five chapters. It includes 67 figures, 14 tables, 5 appendices, and a bibliography of 232 sources, of which 36 are in Cyrillic and 196 in Latin. The structure is logical, well-balanced, and fully meets the requirements for this type of academic work: introduction, literature review, aim and methodology, results, practical approaches, conclusions, contributions, summary, and thesis-related publications.

The scope and structure of the study reflect a solid theoretical background, a systematic approach, and a consistent scientific inquiry.

5. Literature Review and Theoretical Background

The literature review is thorough, well-organised, demonstrating a very good command of the subject matter. The historical evolution of dental imaging diagnostics is traced, encompassing the shift from analogue to digital systems, the role of contemporary imaging methods, and the specifics of professional training for X-ray laboratory assistants.

Worth noting is the wide range of sources consulted, the inclusion of regulatory documents, international guidelines, and current scientific publications. Particularly valuable is the emphasis on international guidelines related to radiation protection, digital image processing, and professional competencies.

The author systematically examines the main types of dental imaging diagnostics, modern radiographic equipment, the role of CBCT, and the importance of continuing education in the context of digitalisation and technological change. This builds a solid theoretical framework for the subsequent empirical research.

6. Aim, Objectives, and Hypotheses

The aim of the thesis is formulated clearly, in specifics, and in full accordance with the title and research content: to analyse the contemporary competencies of X-ray laboratory assistants in dental imaging diagnostics, to formulate guidelines for their expansion in response to the global shift toward digitalisation and artificial intelligence.

To achieve this aim, seven tasks have been set, encompassing theoretical analysis, investigating the views of key stakeholders, identification of training deficiencies, and the development of an educational solution in the form of an elective course. The three hypotheses formulated are logically connected to the aim and objectives, clearly defined, and allow for reliable empirical verification.

There is a sound correspondence between the aim, objectives, hypotheses, subject, and object of the research, which indicates methodological consistency and conceptual clarity.

7. Research Methodology

The methodology has been developed with precision and is fully suited to the stated aims. The research is a multi-sectoral, multi-stage study using a combined approach to incorporate both quantitative and qualitative methods.

The survey included a total of 317 respondents, distributed across five groups:

- 24 lecturers
- 127 students
- 113 practising X-ray technicians
- 46 employers
- 7 experts

The multi-faceted approach is a key strength of the methodology. It enables the problem to be examined from the perspectives of the educational setting, students, practising professionals, employers, and experts. The inclusion of respondents from all four medical colleges in the country training X-ray laboratory assistants is a significant advantage of the research.

Targeted instruments were developed for each group – four survey questionnaires and a semi-structured interview guide. Appropriate statistical methods were employed, including variance analysis and the χ^2 test, and data were processed using SPSS v. 26.0. Specialised software was used for processing and interpreting qualitative data. The study was conducted in clearly defined stages and is supported by ethical approval, which further enhances its reliability.

8. Main Results and Assessment

The results are presented systematically, with appropriate tabular and graphical visualisation, and allow for a clear interpretation of the established trends.

The study reveals significant differences between the groups regarding competency assessment for work with digital dental imaging diagnostics. Lecturers generally give higher ratings to the existing training, while students, practising X-ray technicians, and especially employers express more critical views. These differences are particularly valuable as they highlight the real gap between academic training and practical expectations.

Particularly revealing are the findings indicating that 80.5% of X-ray laboratory assistants and 71.7% of employers consider the training in dental imaging diagnostics to be insufficient. At the same time, a considerable number of practising X-ray technicians report that upon starting work, they did not feel fully prepared, particularly in practical terms. A clear distinction is established between the more favourably assessed theoretical training and the considerably more critically evaluated practical training.

A key finding is the identification of core competencies perceived as most important: the ability to apply knowledge in practice, independent work, planning and organising the radiographic process, knowledge of the main dental techniques, and patient safety awareness.

Particularly valuable is the finding of broad agreement across all groups regarding the need for additional training. A significant share of respondents view the elective course as a suitable means of strengthening professional competencies. The identified priority areas for such an elective course include practical skills, dental image processing, working with modern digital equipment, and adapting to new technologies.

Expert assessment confirms these results. All interviewed experts agree that technological advancement requires the expansion of competencies and support the need for additional training.

The results are interpreted correctly, and statistical analysis is used appropriately to establish significant differences between the groups.

9. Practical Approaches and Applied Value

One of the strongest aspects of the thesis is its distinctly applied focus. In Chapter Four, the author develops specific educational solutions based on the results of the empirical study.

First, a curriculum for the elective course on Dental Digital Imaging Diagnostics has been created, structured into 30 classroom and 30 independent study hours, carrying 2 ECTS credits. The curriculum is well-balanced between theory and practice and is placed at an appropriate stage of training. In terms of content, it covers modern digital technologies, image processing, radiation protection, patient communication, and working with CBCT data. This makes it a genuinely useful educational product.

Second, an electronic library of anonymised dental images has been developed, organised by formats and modalities. This resource has high educational value, as it supports the development of practical skills in image analysis, comparison, and processing, including in paediatric dental practice.

Third, the author presents the connection between the thesis research and participation in Research Project No. 23005, through which opportunities for practical training with specialised software and three-dimensional imaging data are expanded. This element adds further relevance and demonstrates good integration among research, educational, and practical activities.

Chapter IV is a compelling demonstration that the thesis not only analyses the issue but also extends to the development of specific, well-reasoned, and practically applicable solutions.

10. Conclusions, Contributions, and Academic Originality

The thesis contains clear and logically substantiated conclusions that follow from the results and correspond to the stated objectives. In light of this, the following more significant contributions may be noted:

Theoretical and Cognitive Contributions

1. A comprehensive study was conducted on the competencies of X-ray Laboratory assistants in dental digital imaging diagnostics, incorporating all key stakeholders.
2. Significant discrepancies between the academic assessment of training and the needs of practice have been identified.

3. The need to update and expand professional training in the context of digitalisation has been substantiated.

Practical and Applied Contributions

1. A curriculum for the elective course on Dental Digital Imaging Diagnostics has been developed.
2. An electronic library of anonymised dental images has been created as a training resource.
3. Opportunities for enriching practical training through the use of modern digital technologies and specialised software have been outlined.

The study stands out for its considerable originality, both in the choice of research subject and in the instruments developed and the practical outputs produced. Particularly commendable is that the research not only identifies an existing problem but also offers solutions for addressing it.

11. Publications and Thesis Summary

The doctoral candidate has presented two thesis-related publications (she is a single author of one of the papers), as well as participation in a research project. The publication activity presented meets and even exceeds the minimum requirements for awarding the educational and scientific degree of Doctor of Philosophy.

The thesis summary has been prepared correctly and reflects the essential elements of the thesis: relevance, aim, objectives, methodology, results, conclusions, contributions, and publications. It provides a clear, concise, and sufficiently complete overview of the research content and achievements.

12. Conclusion and Recommendation

The thesis by Elka Dancheva Kostova on the *Modern Competencies of the X-Ray Laboratory Assistant in Dental Digital Diagnostic Imaging* represents a current, thorough, and practice-oriented scientific study. The author demonstrates sound theoretical knowledge, the ability to independently conduct empirical research, correct processing and interpretation of results, and the capacity to formulate applicable and well-reasoned recommendations.

The scientific-theoretical and applied results support the conclusion that the thesis fully meets the requirements for acquiring the educational and scientific degree of Doctor of Philosophy.

Based on the above, I give a positive assessment of the thesis and propose that the esteemed Scientific Jury to award Elka Dancheva Kostova with the educational and scientific degree of Philosophy Doctor (PhD) in the doctoral program Healthcare Management, professional area 7.4. Public Health, a field of higher education 7. Healthcare and Sports.

Date: 14/04/2026

Reviewer: Заличено на основание чл. 5, §1, б. „В“ от Регламент (ЕС) 2016/679

Assoc. Prof. Silvia Filkova, PhD